WOMEN'S EMPOWERMENT AND CHILD NUTRITIONAL OUTCOMES IN MODERN-DAY INDIA

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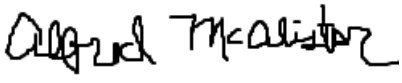

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ABSTRACT

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India still struggles to mitigate its severe childhood malnutrition rates despite its impressive economic growth and reduced poverty rates. In exploring effective ways to improve child nutritional outcomes in South Asia, social scientists and public health officials have recently identified the disempowerment of women as a significant barrier to achieving child welfare goals. Although there have been cross-national studies carried out throughout South Asia and other developing countries, none have specifically examined the association between women's empowerment and child malnutrition in modern-day India. Using India's 2005-06 National Family and Health Survey, this study assesses the significance of the relationship between four women's empowerment indicators—household decision-making power, mobility, attitudes towards domestic violence, and highest level of schooling—and malnutrition in children under five years of age, as measured by the prevalence of stunting and wasting. The main analysis used a progressively adjusted logistic regression model, which estimated the effects of women's empowerment on child's nutrition outcomes whilst controlling for maternal age at birth, the household wealth index, and the type of place of residence, meaning, rural or urban settings. Results indicate that attitudes towards domestic violence has a significant effect on wasting and that the mother's highest level of education has a significant effect on both stunting and wasting, while controlling for the three demographic variables and other indicators. These results suggest that better conceptualization and measures of empowerment are needed to examine the real nature of its effect on child nutritional status. They also reiterate the importance of maternal education in reducing malnutrition rates.

Keywords:

Women's Empowerment, Gender Inequality, Child Malnutrition, India

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DEDICATION

I dedicate this thesis to the women of Sanatkada in Lucknow, Uttar Pradesh who showed me the true meaning of inner-strength and fearlessness. The way that you all persevere—for yourself, for your friends, and for your children—despite your difficult circumstances are a testament of *power* and beauty. Thank you for inviting me into your lives for, what seemed to me, to be too short of a period of five months. Even though it may be a while before I can make my way back to U.P., I hope that we can all meet again.

CHAPTER I: INTRODUCTION

Childhood malnutrition is a significant public health problem in many low- and middle-income countries and causes unimaginable suffering. Indeed, malnutrition[1] is associated with more than half of child deaths (aged 6-59 months) in 53 developing countries, with thirty percent, meaning 167 million, of all children under the age of five in developing countries malnourished (Pelletier *et al*., 1995; Smith and Haddad, 2000). And those who survive malnutrition as children experience serious health concerns during development and into adulthood (Hoddinott *et al*., 2012; NFHS-2 1998-99).

Although child nutritional stats in developing countries have improved over the past several decades, South Asia continues to struggle to achieve substantial improvements with its high rates of childhood malnutrition. Estimates show that South Asia has the highest prevalence of malnutrition in the developing world, giving rise to 50% of malnourished children under the age of five globally (Smith and Haddad, 2000). Moreover, of the two regions that have the world's most severe malnutrition rates, Sub-Saharan Africa (SSA) and South Asia, South Asia's rate is almost 20% higher than SSA's (Smith and Haddad, 2000). Long-accepted determinants of child nutritional status fail to explain South Asia's high malnutrition rate; rather, these determinants would predict South Asia's lower malnutrition rate relative to SSA's (Smith and Haddad 2000). Child health and nutrition expert Vulimiri Ramalingaswami dubbed this puzzling incongruity the "(South) Asian enigma" (Ramalingaswami *et al.*, 1996).

In India, undernutrition rates in children under three years is measured in terms of the prevalence of stunting (low height for age) and wasting (low weight for age). According to the

[1] Here, malnutrition is defined as having a weight-for-age that is more than two standard deviations below the median weight-for-age per National Center for Health Statistics/World Health Organization standards

2015 India Health Report (IHR) on Nutrition, 39% of children under five suffer from stunting and 15% from wasting. These statistics warrant serious consideration because the overall global stunting rate is 24%, and the prevalence of wasting usually falls below 5%, even in poor countries. Likewise, the World Health Organization considers the prevalence of wasting at or above 15% to be critical, making India one of the worst cases of child undernutrition. The country's exceptionally high malnutrition rates, thus, makes the subcontinent a priority in addressing malnutrition in developing countries. If its leaders fail to address this issue, India's record economic growth will likely suffer. The health deficits from nutritional deprivation will lead to a growing workforce with poor cognitive skills and lowered productivity. Mitigating childhood malnutrition is crucial in achieving better child health outcomes, as laid out in Goal 1 of the Millennium Development Goal, and has the potential to positively affect the nation's future developmental gains (UNESCAP Team, 2015). In addition to India's leaders and health workers, relevant members of the international community also have a moral responsibility to help combat this humanitarian crisis.

Fortunately, the answer to South Asia's struggle to resolve this "Asian enigma" may lie in empowering women. India's unusual circumstances have led researchers to examine a rather novel relationship—that is, the link between women's status, or their "power relative to men," and child nutritional outcomes (Ramalingaswami *et al*., 1997, Haddad *et al*., 1996). This connection bears merit because women's status in India's is substantially lower than that of women's in SSA (Smith and Haddad, 2000). The discrepancy likely results from India's unique economic and political structures along with its patriarchal socio-cultural norms, both of which beget the discrimination of women and their inferior status.

Many studies suggest that women's low status affect their children's nutrition status through compromising maternal health. Poor maternal health unsurprisingly negatively impacts the birthweight of their children. It follows that mothers, or aspects about them, may have a significant role in influencing their children's nutritional status. Thus, this study attempts to more directly examine *how* mothers influence child nutritional outcomes by focusing on a subset of the concept of status known as women's empowerment. Previous studies have demonstrated an indirect association between women's empowerment and child nutritional outcomes through mediating variables, usually that of maternal health status (Richards *et al*., 2013; Bhagowalia *et al.*, 2012; Smith *et al.*, 2003; Ziaei *et al.*, 2012). However, this thesis aims to explore the presence of a direct relationship between women's empowerment in the household and child development outcomes. There is considerable evidence that indicate examining women's empowerment as a function of intra-household dynamics could help shed light on improving child nutritional outcomes (Kishor, 2000; Jejeebhoy, 2000; Bold *et al*., 2013; de Schutter, 2013). As none of previous relevant studies focus on modern-day India in both urban and rural contexts, as far as I am aware, this thesis will do so using nationally representative data from India's third National Family Health Survey (NFHS) conducted in 2005-06. The study asks two questions:

1. In contemporary India, is women's empowerment in the household associated with childhood malnutrition?

2. If this association exists, which aspects of women's empowerment are the most relevant?

In considering these questions, the study focuses on three direct indicators and one proxy indicator as measurements of women's empowerment to better understand the role that these

indicators play in relation to child nutrition status. The indicators are involvement in household decision-making power, mobility, attitudes toward domestic violence, and level of education.

The next chapter discusses relevant literature on women's empowerment indicators and child malnutrition in the context of developing countries and, more specifically, in South Asia. Chapter 3 describes the data and methodology that the subsequent results in Chapter 4 displays. The last chapter, Chapter 5, offers intervention recommendations based on the implications of the results and finishes with closing remarks.

CHAPTER II: LITERATURE REVIEW

Most existing studies evaluating the association between women's empowerment and child's nutritional status find a positive relationship. Most recently, Smith et al.'s (2003) cross-national study found that women's empowerment has a positive influence on child nutrition indicators. Therefore, the evidence in support of mitigating child malnutrition by empowering women is certainly robust.

However, the findings are not as consistent in the context of modern-day India. There is a predominantly positive relationship between women's empowerment and children's nutritional status, though there are some cases that exhibit ambiguous results. For example, Maitra's (2004) study using the NFHS-2 finds that child health is indirectly affected through improved healthcare usage, which is determined by women's education and control over household resources. Again, using the NFHS-2 data, Kravdal's (2004) study shows that women's empowerment, as measured by (i) average women's education and (ii) attitudes towards domestic violence, display a significant association with child mortality rates. Lastly, Ackerson and Subramanian's (2008) analysis of the NFHS-2 data reveal that domestic violence increases the incidence of not only stunted children, but also of underweight women. Naturally, if we were to examine the studies that specifically analyzed our three proposed empowerment indicators, we will find similarly unclear results.

Indeed, prior research set in South Asia that studied our first three indicators of women's empowerment in relation to child nutrition show indeterminate results. For instance, some studies suggest that no association, or even a negative association, exists between women's involvement in household decision-making power and some child nutrition measures (Shroff *et al.*, 2011; Begum and Sen, 2009; Bose, 2011; Sethuraman *et al.*, 2006; Shroff *et al.*, 2009;

Brennan *et al.*, 2004). Other studies suggest that maternal decision-making power has a positive or protective effect on some child nutrition outcomes (Aslam and Kingdon, 2012; Shroff *et al.*, 2011). Similarly, measures of mobility also display inconclusive associations with child nutrition (Shroff *et al.*, 2009; Shroff *et al.*, 2011; Sethuraman *et al.*, 2006). In relation to the attitudes towards domestic violence indicator, however, the results are largely homogenous. These studies show that children of women who are less likely to condemn acts of violence are more likely to have poor health outcomes (Bhagowalia *et al.*, 2012; Smith *et al.*, 2003; Jejeebhoy, 1998).

Although the existing literature reveals somewhat inconsistent outcomes, the presence of an association between many women's empowerment indicators and child nutritional outcomes warrants additional analysis of the explanatory variables in a different context—or mainly, in India, as the subcontinent is the most populous region in South Asia. The country's massive population size may mean that mitigating the prevalence of child malnutrition through addressing gender inequality could translate to a meaningful reduction in South Asia's overall malnutrition rates. In investigating the nature of the relationships of women's empowerment and child health outcomes, this review will also address the weaknesses of previous analyses. The aim of this analysis, more than simply to determine the true nature of the association, is to promote methodological improvements that will aid future studies in achieving results with greater accuracy and precision.

Before further discussing the relevant literature on the indicators, however, I will define women's empowerment to provide the conceptual underpinnings of the indicators. I will then offer my hypotheses as I also discuss the strengths and limitations of previous research. Finally,

I will present my conceptual framework as a part of a discussion about relevant theoretical considerations behind my theory.

(a) Definitions and Measurements of Women's Empowerment

Many definitions of women's empowerment have focused on notions of agency, control, decision-making, and power (Kabeer, 2001; Malhotra *et al.*, 2002; Alsop *et al.*, 2006; Ibrahim and Alkire, 2007; Samman & Santos, 2009). A popular definition that has guided many contemporary conceptualizations of empowerment frames it as a process of enhancing an individual's or group's capacity to make effective choices—that is, the perceiving an ability *to make choices and then to transform those choices into desired actions and outcomes* (Alsop *et al.*, 2006). This capacity is influenced by two interrelated factors: agency and opportunity structure. And, thus, the degree of empowerment hinges on the extent of the actor's perceived agency and the nature of the available opportunity structure. Agency refers to *an actor's or group's ability to make purposeful choices;* and opportunity structure refers to the *broader institutional, social, and political context of formal and informal rules and norms within which actors pursue their interests*. The interaction between agency and opportunity structure is thus iterative because the presence or absence of one influences the degree of impact of the other.

This current study focuses on women's empowerment in the domestic sphere—meaning, their freedom from control by other family members and ability to effect desired outcomes within the household. The aspects enumerated earlier—participation in household decision-making power, mobility, and attitudes toward domestic abuse — will be considered indicators of the woman's agency. I argue that one should consider agency as comprised of behaviors *and* attitudes. Behaviors include the first two indicators—household decision-making powers and mobility— as these indicators clearly reveal the woman's intra-household agency. We should

modify the accepted definition of agency to incorporate attitudes—mainly, attitudes toward domestic violence— as the woman's justification of certain instances of physical abuse demonstrates her acceptance, however resigned, of a patriarchal gender system. And this system may ultimately inform the way that she acts or does not act, which effectively strips her of her inter-agency. An attitude of acceptance about domestic violence can reveal as much as about the woman's agency as her behavior does.

The second component in conceptualizing women's empowerment comprises of the opportunity structure, or the characteristics of the woman's community. In other words, social context can also be an important indicator to examine as a part of determining the woman's level of empowerment. Relevant social contexts include the local geographic community, meaning the context wherein much of the day-to-day interpretation of social norms and informal sanctioning of those who violate these norms occur. Similarly, the social context also includes things such as communities of identification, such as religious or ethnic communities. As individuals who belong to and are strongly influenced by ideologies or normative systems within these communities, these individuals may share or are subject to ideologies of gender that can influence how women are treated or regarded. These ideological systems define the fundamental principles of social life, such as, how to organize families (family systems), or how to organize relations between males and females (gender systems). For example, the lowest levels of women's empowerment—in terms of economic decision-making, say in family size decisions, and freedom of movement—in South Asia are found in Pakistan and Uttar Pradesh, which are northern areas of predominantly Muslim communities (Mason and Smith, 2003). On the other hand, women in Tamil Nadu, a southern state of predominantly Hindu communities, have the greatest reported freedom of movement.

These two examples show us that empowerment is a relational concept. In other words, people are empowered or disempowered in relation to the people with whom they interact (Narayan, 2005; Mason, 2005). And, because empowerment is relational, we must consider aspects such as norms, values, and beliefs of the immediate community in examining empowerment (Narayan, 2005; Mason, 2005). For instance, in a 2003 study of five Asian countries, country and community of residence better predict women's domestic empowerment than their personal demographic and socioeconomic traits (Mason and Smith, 2003). In another example, in India, Muslim women tend to be less empowered than their Hindu counterparts, even though both groups of women often live in the same geographic regions (Mason, Morgan, and Smith, 1998). This context-specific variation calls for a more in-depth examination of the effect that demographic differences can have on explaining differences in levels of empowerment that women experience. Therefore, all future analysis on women's empowerment should consider variability in gender and family systems across different communities. As a result, this analysis will examine the opportunity structure to understand the differences in degrees of empowerment that women have in households throughout different parts of India.

(i) *Direct vs. Indirect Indicators of Women's Empowerment*

The discrepancy in the definition, operationalization, measurement, and analytical approaches used to examine women's empowerment in the existing literature make comparisons difficult to carry out. For example, women's empowerment currently has several known definitions, with its recognized indicators split into similarly vast classifications of indirect vs. direct measures (Ibrahim and Alkire, 2007). Moreover, researchers exploring the relationship between women's empowerment and child nutritional outcomes use analytical methods that

range from regression analysis to confirmatory factor analysis in measuring its various associations.

There is, however, an important development that the scholarly community has agreed upon and respects its precedent. Despite the wide variety and, sometimes, imperfect, measures of empowerment, more contemporary studies argue for the exclusive use of direct, as opposed to proxy measures (Malhotra *et al*., 2002; Meizen-Dick *et al.*, 2012). Frequently used proxies include measures such as women's age, age at first marriage, age difference between husband and wife, and employment status (Mason, 1986). These indicators initially appear logically sound. As an example, a larger age gap between husbands and wives should undermine the women's empowerment. Earlier research argues that a larger age differential means that the husband more likely deprives his partner's empowerment as his status relative to hers—as measured by his sense of self-confidence and overall experience—increases (Cain and Kaufmann, 1994).

These proxy measures, however, only index individual-level processes that cannot accurately represent women's empowerment at an aggregate level, like that at the level of an entire country. As I had briefly mentioned earlier, the interrelatedness of women's empowerment and community factors—such as gender and family systems—demonstrate the necessity of using indicators that take into consideration the appropriate social context. If we reexamine the age gap example, we see that this indicator is explained in the context of the household, and not that of the community. A more accurate way of determining whether this indicator is appropriate for measuring women's empowerment should consider if the applicable gender system that contributes to the larger age gap between spouses *also* disempowers women (Mason and Smith, 2003). Thus, proxy measures that some previous studies have used only

index some aspects of women's empowerment, and, even then, they only do so in certain contexts.

As a last example, a woman's level of education is an indicator that many recent findings have called into question as an adequate—or direct—measure of empowerment. These results suggest that providing a woman with schooling does little to empower them (Mason and Smith, 2003). An extensive education may equip the woman with knowledge and a sense of self-efficacy, however, even the best education cannot provide the woman with social or socioeconomic parity if she lives in a society that practices—no matter how inadvertent or deliberate—sex-based discrimination. The persisting gender pay gap in the US is testament to this idea that educated and qualified women do not necessarily have the same earning potential as similarly educated and qualified men (Hegewisch and Hartmann, 2014). Thus, the three indicators examined in this study are direct measures of empowerment in the sense that they do take into consideration the relevant community structure.

(b) Controls

Certain demographic variables can distort our study's estimate of the effect of women's empowerment on child nutritional outcomes. These variables are considered confounding variables because they vary systemically with our study's hypothetical causal variables, the three empowerment indicators, and can lead to erroneous conclusions about the relationships between our variables of analysis. As a result, this study includes three controls in the data analysis that serves to maintain the internal validity of our experiment. The controls are maternal age at birth, household wealth index, and type of place of residence, meaning, either urban or rural areas.

Many studies done in India show that maternal age at birth plays an important role in determining the child's health, as measured by rates of infant and child mortality. Women who

have children between the ages of 20-29 have the lowest infant mortality rate (50 per 1,000 live births) whereas women who have children at either less than 20 years of age (77 per 1,000 live births) or within 40-49 years of age have a significantly higher infant mortality rate (72 per 1,000 live births). Other possible confounding variables are birth order, with undernutrition increasing steadily with higher birth order for both stunting and wasting prevalence; and interval between previous and current births, with undernutrition decreasing with longer birth intervals. Even though our analysis doesn't control for the two latter confounders, future studies should examine the impact that they have on the relationship between women's empowerment and child nutritional outcomes.

Our study's second control is socioeconomic status, as measured by household wealth index. Data shows that child nutrition outcomes improve steadily with an increase in household wealth index. For instance, children from households with a high standard of living are twice as likely to display healthy nutrition markers as children from a low standard of living. Moreover, the infant and under-five mortality rates are highest for children in households in the lowest wealth quintile. Although our study doesn't account for caste or tribe of the household, caste is another important socioeconomic determinant that should be examined in more detail. For example, children belonging to scheduled castes and tribes, or other backward classes, experience the highest levels of undernutrition as measured by wasting and stunting prevalence.

The last control is the type of place of residence according to rural or urban standards. A significantly higher child undernutrition rate occurs in rural areas than urban areas. Interestingly, however, child sex differentials introduces another important source of variation that sociologists should account for when studying child health outcomes in the future. Statistics from the NFHS-

3 indicate that females in rural areas and males in urban areas have higher infant and under-five child mortality rates.

(c) Hypotheses

The first indicator, attitudes towards domestic violence, affect child nutritional outcomes through different, but simple, pathways. The presence of domestic violence itself demonstrates a significant psychosocial risk factor for the mother and child in the household. Previous research shows that domestic violence directly affects the physical and mental well-being of women and displays associations with maternal health outcomes such as depression, anxiety, and low self-esteem and self-efficacy in South Asia (Smith *et al*., 2003).

In India, specifically, exposure to intimate partner violence is associated with women experiencing anemia and being underweight, with evidence that suggests similar symptoms of morbidity in children within the same household (Ackerson and Subramanian, 2008). Needless to say, a woman who experiences domestic violence is less likely to be physically and psychologically adept to provide for her child. Many studies use *experiences* of physical violence as a reliable way to measure women's empowerment, or her lack thereof. Though quantitatively aggregating instances of physical abuse may have been a preferable measurement for this study's analysis, there is a substantial dearth in data points that make attaining a representative sample size difficult. Understandably, women are more likely to express their attitudes towards domestic violence, rather than disclose instances of their experience with it.

Regardless of the data set's lacking substantial data points, however, we can arguably reason that women who condone greater instances of domestic violence are less so able to positively impact their child's well-being. The woman's misconception of any domestic violence acts as justifiable behaviors—in any circumstances—demonstrates a lack of

understanding that these behaviors negatively affect her and her child in the long term, and, thus, she's less likely to seek help or remove herself from the situation. Moreover, her accepting of spousal abuse is an indication that she either believes or is forced to accept the belief that women are inferior to men, and, therefore, they should be treated with less consideration regarding their pain or discomfort. In this second scenario, she may understand on some level that domestic abuse is harmful for her and that this behavior isn't defensible, but since she cannot feasibly escape the situation—either because of cultural expectations or financial constraints—she accepts that she must behave in a way that does not provoke her husband's violence. From both perspectives, we see that her justifying physical violence reveals her disempowerment and/or contributes to her being disempowered. The possibility of an association between the woman's attitudes towards domestic violence and the child's nutritional outcomes, thus, leads me to present my third hypothesis:

> *Hypothesis 1*: In households where women condone less instances of domestic violence, a smaller proportion of children experience stunting and wasting than in households where women condone more instances of domestic violence, even after statistically controlling for maternal age at birth, household wealth index, and type of place of residence.

The second indicator, mobility, conveys the degree of the woman's autonomy to move about and her ability to be mobile without permission. The woman's mobility is an important aspect of women's empowerment, especially in patriarchal countries such as India that have a long and widely-accepted tradition of female seclusion, or *purdah*. Their autonomy in travelling outside the home alone reveal that attitudes about gender roles within their homes are such that (i) they don't necessarily impede the women's ability to carry out their intended actions and (ii)

there is a level of independence that the women possess. The woman's freedom of mobility indicates the likelihood that she, as a mother, will encounter new health and nutrition knowledge—a kind of social capital—that may improve their ability to care for the child. Moreover, in a country like India, where deleterious culturally-based health beliefs often drive behaviors, exposure to more progressive ideas or methods of caretaking could help her adjust in a way that improves her childcare.

On the other hand, women who are more restricted in their mobility are less likely to engage in social interactions that could help them better understand the harm in their patterns of beliefs or behaviors. The woman's ability to purchase goods in a timely manner may also affect her child's nutrition outcomes. As opposed to waiting on her husband's permission or planning her day around somebody else's ability to chaperon her trip, the woman can purchase food or medicine for her child as soon as she sees fit (Smith *et al.*, 2003). Therefore, the woman's freedom of movement demonstrates a possible link to child nutritional outcomes and this understanding leads me to assert that:

> *Hypothesis 2*: In households where women have more freedom of mobility, a smaller proportion of children experience stunting and wasting than in households where women have less freedom of mobility, even after statistically controlling for maternal age at birth, household wealth index, and type of place of residence.

The lack of recent consistent results concerning the association between maternal mobility and child malnutrition provide the necessary impetus to once again examine its link in this study. A 2009 study found that mothers in Andhra Pradesh who had greater freedom of mobility to go the markets were less likely to have stunted children, measured under three years of age (Shroff *et al.*, 2009). However, a more recent study in India reports that mothers who

could go to places without asking for permission had children with better length-for-age Z-scores, but no associations were found with actual mobility (Shroff *et al*., 2011). This study shows that there seems to be a significant discrepancy between freedom of mobility and mobility. Conversely, a study in Karnataka, India demonstrates that freedom of mobility within the village was associated with improved child wasting outcomes (Sethumaran *et al*., 2006).

Our third indicator is household decision-making. Generally, women in more patriarchal societies do not have complete autonomy in making decisions. In some cases, they even have little to no agency in making decisions for themselves or for their family. Household decision-making can be grouped into categories such as healthcare-seeking behavior (for the woman herself or for her children), financial autonomy (large household purchases, daily household purchases), or the ability to freely travel outside the home (the freedom to visit family or relatives). The woman's lack of agency in household decision-making is problematic because many studies done in developing countries find tha**t** there is a negative association between maternal participation in household decisions and the prevalence of childhood malnutrition. One landmark study even showed that increased maternal involvement in household decision-making, specifically in playing in a role in allocating the household budget, increases the child's chances of survival by 20% (Walsh, 1998).

This presence of a negative association between the decision-making power and child malnutrition support the belief that, given greater agency or autonomy, the mother will likely allocate household resources in a way that positively affects her child's health (Roushdy, 2004; Shroff *et al*., 2009). In other words, the greater the maternal decision-making power, the less likely the child will exhibit malnutrition symptoms. As such, I assert the following hypothesis:

Hypothesis 3: In households where women have greater involvement in household decision-making, a smaller proportion of children experience stunting and wasting than in households where women have less involvement in household decision-making, even after statistically controlling for maternal age at birth, household wealth index, and type of place of residence.

My stating Hypothesis 3 is not without acknowledging that several studies carried out in developing nations have provided contrary or inconsistent results. A 2008 study in Afghanistan found that a lack of maternal decision-making autonomy was positively associated with stunting and wasting in children under five years of age (Mashal *et al*., 2008). Another study in Andhra Pradesh, India found no association between a woman's ability to control her own health and her child's height-for-age Z-scores (HAZ) under 3 years of age (Shroff *et al*., 2009). And a third study carried out in Uttar Pradesh and Karnataka, India reveal that a woman's sole or joint decision-making for her own health care, in comparison to somebody else making the decision, increased the risk of malnutrition for her children (Brennan *et al*., 2004). Also, as unexpected as the results of the three previous studies, a 2009 study in Nepal found no association between maternal decision for daily household purchases and large household purchases with the child's HAZ (Dancer and Rammohan, 2009). There are many possible explanations for these unanticipated findings, with the most probable being that the models did not adequately capture all the dimensions of maternal decision-making power. Thus, the results of the data analysis may not have accurately represented the true nature of this relationship.

Although we briefly established earlier in the literature review that education isn't necessarily a direct measure of women's empowerment, substantial evidence show that improving women's access to education reduces the prevalence of childhood malnutrition.

Smith and Haddad's (2000) cross-country analysis of 63 developing nations covering a 25-year period found that 43% of the aggregate 15.5% reduction in malnutrition rates was attributable to improvements in female school enrollment rates. The proven impact that women's education has on reducing malnutrition rates compels me to further explore its association to child nutritional status as a part of my study. My fourth and final hypothesis, thus, states:

Hypothesis 4: In households where women have achieved higher levels of schooling, a smaller proportion of children experience stunting and wasting than in households where women have achieved lower levels of schooling, even after statistically controlling for maternal age at birth, household wealth index, and type of place of residence.

(d) Theoretical Considerations

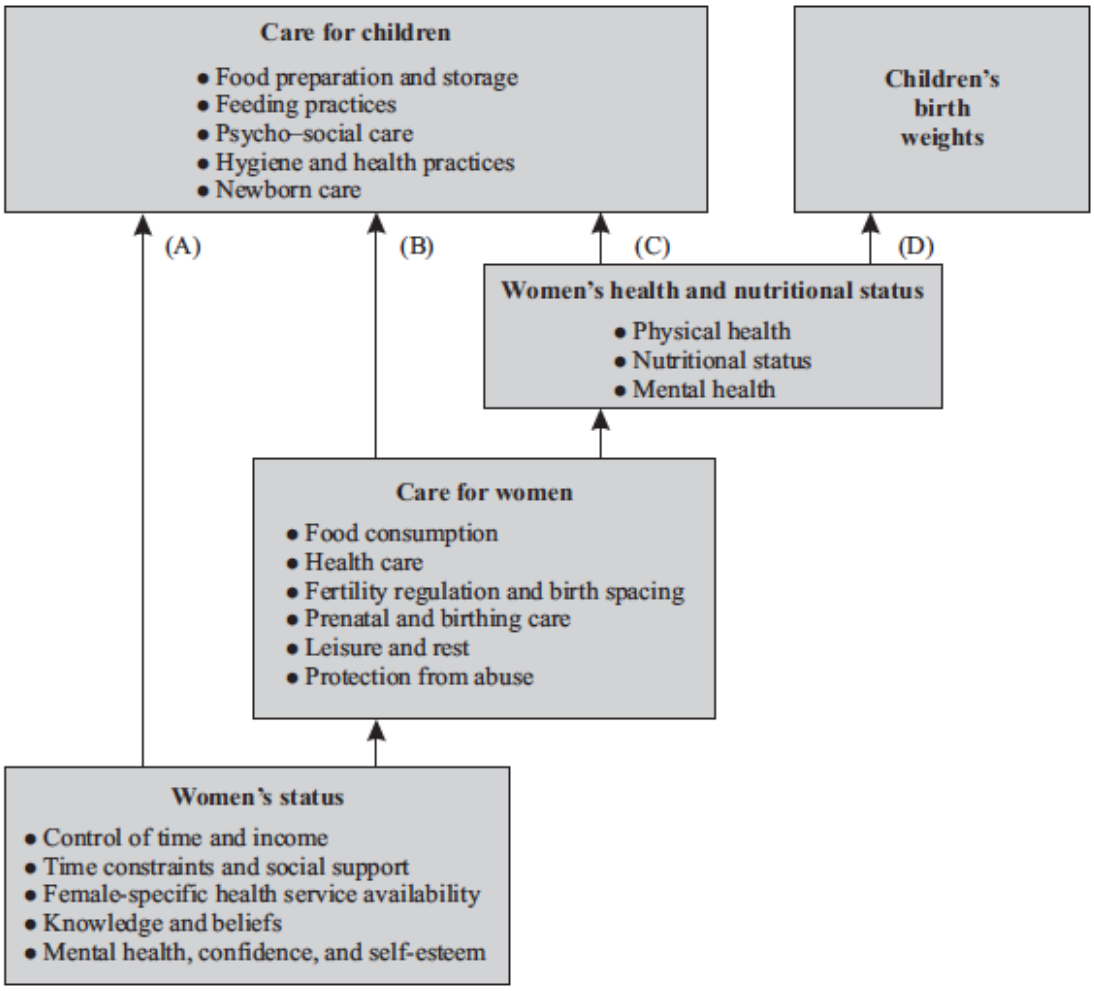
This section first offers a short discussion about a popular and widely-accepted conceptual framework and then details my study's conceptual framework.

Engle, Menon, and Haddad's 1999 study on child malnutrition determinants provide a conceptual framework—as depicted by Figure 1—that has informed many studies regarding women's empowerment and child health outcomes. Their conceptual framework, however, emphasizes women's status as a main determinant of child nutrition outcomes. If we consider that the concept of empowerment is a subset of that of status, we can assume that a woman's status and level of empowerment are essentially interchangeable terminologies, albeit with slightly different definitions. Now that we have reconciled the differences in jargon, we can move on to examine a specific component of their framework.

As shown by arrow D in Figure 1, the researchers had proposed maternal health, labeled as the women's health and nutritional status, as an intervening variable that links women's status and child nutritional status, as measured by birth weights. I had mentioned earlier in the

introduction that the scholarly community recognizes this idea that maternal health and wellness act as an indirect link between women's status and child nutritional status. Naturally, we understand that a woman's lower status confers negative effects on her overall health, which affects her child's health. In patriarchal societies such as that of India's, the woman's health is considered secondary to that of man's, and she often receives or only has access to poorer quality material resources, such as food or healthcare. An average woman in such societies like India's are understandably more likely to be malnourished or sick relative to their male counterparts. As a brief example, India has a marked gender differential in daily consumption of fruits and protein, with men consuming over 10% more of these food products than women do (NFHS-3, 2005-06). This example illustrates that gender inequality leads to adverse child nutritional outcomes as chronically malnourished or nutrient-deprived women give birth to low birth-weight infants, who tend to remain underweight even as children (WHO, 1995; Ramakrishnan *et al.*, 1999).

Of course, the woman's mental health also acts as an important component that may affect the state of her overall health. Lower status women are more likely to experience psychological or emotional abuse in their homes, and this abuse can affect the woman in a way that also negatively affects her child's nutritional outcomes. For instance, the woman's mental distress may be serious enough to cause a loss of appetite, and, as a result, she becomes unable to maintain a healthy weight during her pregnancy. Although the relationship between this kind of abuse and child nutrition status remains unsupported by empirical evidence, the well-accepted understanding of the interrelatedness of one's physical and mental health justifies our assumption. In other words, the woman's mental health affects her physical health, which ultimately affects her child's health.



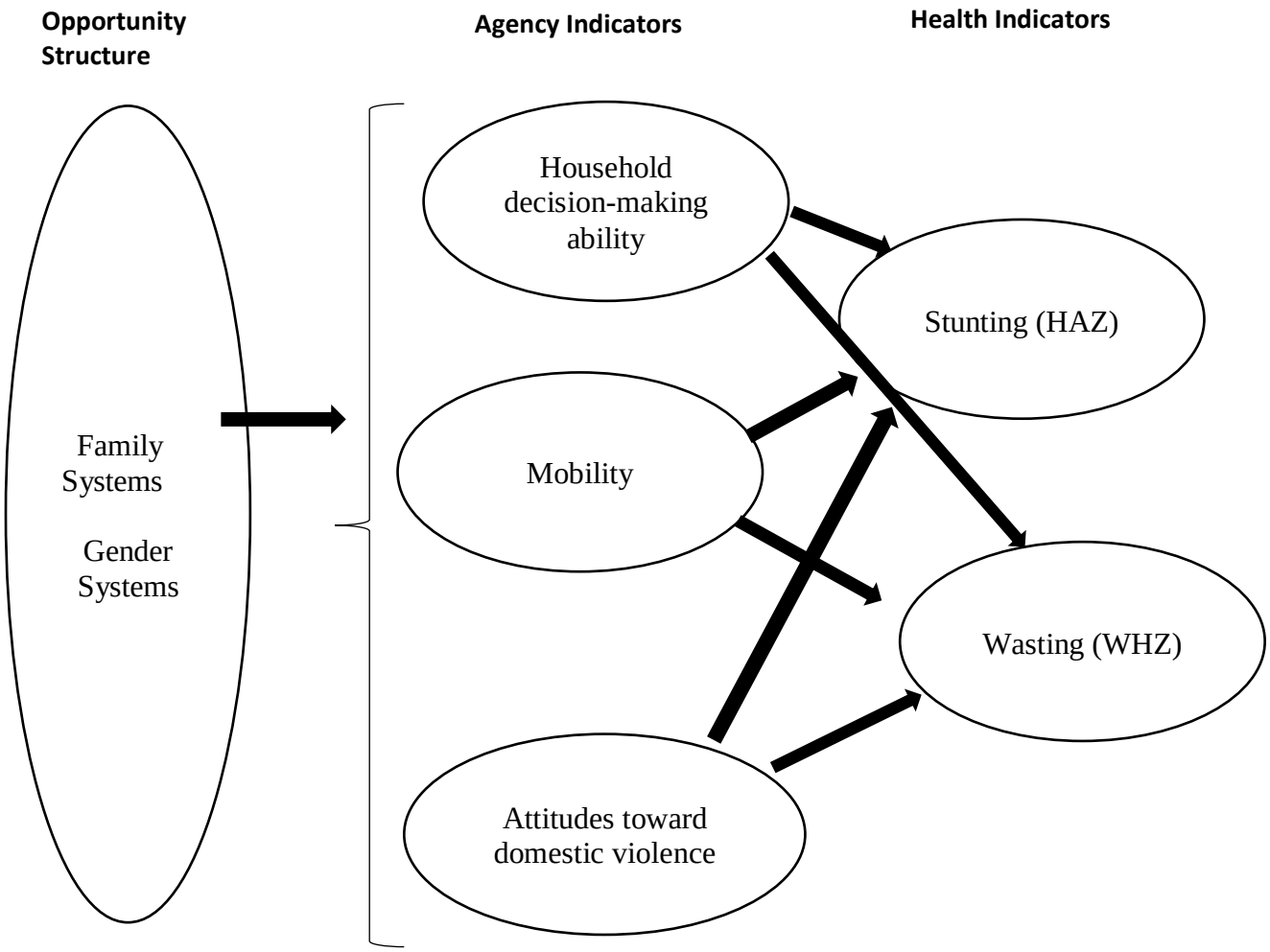
Source: Adapted from Engle, Menon, and Haddad 1999.

Figure 1: Indirect Links Between Women's Status and Child Nutrition Outcomes

Engle, Menon, and Haddad's conceptual framework helped me to visualize the different pathways through which a woman's status affect her child's nutritional outcomes. Unlike their framework, however, I aim to examine the presence of a direct association between the woman's level of empowerment and her child's nutritional status. In other words, my study excludes maternal health status as an interceding variable. With this adjustment and my prior literature review in mind, I constructed this study's conceptual framework, as depicted in Figure 2.

The conceptual framework includes three main components: the opportunity structure, the agency indicators, and the child's health indicators. As I had noted earlier, the two iterative factors that guide the conceptualization of women's empowerment are (i) the nature of the relevant opportunity structure and (ii) the degree of agency the woman possesses. Since my study examines empowerment in the context of intra-household dynamics, the opportunity structure must include factors that influence the degree to which the woman can make effective choices within the home. Based on an analysis of applicable studies, I reasoned that these factors should be gender and family structures as they are relevant properties of the woman's social context that determine the nature of her intra-household relationships (Mason and Smith, 2003). I represent this logic by placing the opportunity structure as a preceding component to the woman's agency indicators. And the woman's intra-household agency is measured by her participation in household decision-making, her degree of autonomy of mobility, and her attitude toward domestic violence. The last component, the child's nutritional status, is measured by the prevalence of stunting or wasting. My framework more succinctly illustrates what has been discussed here—that is, the nature of a woman's opportunity structure influences the degree of her agency within the household, which ultimately influences the child's nutritional status.

Figure 2: The Conceptual Framework



CHAPTER III: Method

(a) Data and Sample

This study uses individual-level data from India's third National Family Health Survey (henceforth NFHS-3) as the survey provides nationally representative data about health and nutrition trends for women and young children. Under the supervision of the Government of India, the International Institute for Population Sciences (IIPS) coordinated the survey in two phases from November 2005 to its completion in August 2006.

The NFHS-3 used three types of questionnaires to collect data on population, health, and nutrition trends. For the purposes of this study, I exclusively examined the Women's Questionnaire as it collected data on women's empowerment indicators, including the three indicators that this analysis uses. An initial population of 124,385 ever-married and never married women aged 15-49 at the time of the study were interviewed, obtaining a response rate of 94.5%. I ultimately narrowed the sample size to 23,040 women for this analysis. This smaller sample size necessarily excluded women who did not have children; mothers whose children were not within the measured age (birth to <3 years) range at the time the study was conducted; and/or mothers whose children did not have recorded responses for their height and weight. The analysis also excluded the missing responses or cases on relevant questions concerning our empowerment indicators (n=439 observations deleted).

To measure the child's nutrition status, the analysis used the anthropometric data provided by the national survey. The NFHS-3 recorded the heights and weights of children up to five years of age, or <60 months, and provided an initial population size of n=51,555. I then restricted the sample size to include only children within the 0 to <36 months' range (n=22,865 observations deleted). I then further restricted my sample size to exclude cases wherein the

children did not provide their age in months or the necessary height and weight measurements, who were not living in the household at the time the survey was conducted, or were otherwise not present (n=5,211 observations deleted). Accordingly, all children living in the household at the time of the survey, who met the age requirement for the analysis, meaning, from 0 to <3 years of age, and who had valid measurements to determine stunting and wasting prevalence were included in our final analytical sample size. The final sample size was 23,040 children.

(b) Measures

(i) Independent Variables

In addition to the stunting and wasting variables, our regression analysis includes measures of household decision-making, freedom of mobility, attitudes towards domestic violence, and the mother's highest level of education as predictor variables. Many studies of this nature create aggregate measures of each empowerment indicator. These studies design indexes that consider the degree to which the woman has (i) sole autonomy or control over a range of decisions and (ii) complete freedom to visit a list of places unescorted (Hindin, 2005). Except for the variable corresponding to the mother's highest level of education, my study uses this kind of index-building to capture the variation in levels of empowerment that the woman experiences in her specific setting. And I created the necessary aggregate measures by constructing variables that pool information from multiple relevant variables into one.

Another reason why I had created these aggregate variables had to do with eliminating multicollinearity in the regression analysis. Collinearity or multicollinearity occurs when two or more predictors in a regression model are correlated with each other. Regardless of whether this correlation is moderate or high, the presence of any collinearity can limit the accuracy of our analysis. For example, the NFHS-3 contains five different variables corresponding to

participation in decision-making. As five separate decision-making variables, they are all highly correlated with each other. This issue of collinearity arose in the mobility and attitude toward domestic violence variables as well. As a result, I attempt to reduce the possible effects of this happening in my regression analyses by creating a single variable for each of the indicators.

To measure household decision-making autonomy, I constructed the variable DECISION. As I had mentioned earlier, this variable combines information from five already-constructed decision-making variables provided by the NHFS-3. These variables assessed the women's decision-making power regarding: their own health care, making large household purchases, making purchases for daily needs, visiting their family or relatives, and allocating the husband's earnings. And the women indicated the degree of autonomy in decision-making available to them by recording who usually makes these kinds of decision: mainly them, mainly their husband, them and their husband jointly, or someone else.

To create the DECISION variable, I used an additive index of participation in decision-making that accounted for the variability in the degree of autonomy or lack thereof that the woman has in making said decisions. I first created a count of domains wherein the woman can make decisions or play a role in. This count combined the information from the five original NFHS-3 variables that I had mentioned in the previous paragraph. Then, I recoded the information that I had compiled so that the most maternal involvement gets the lowest numerical demarcation. The classification is as follows: (0) the woman participates in all five of the decisions, (1) the woman participates in greater than zero, but less than five of the decisions, and (2) the woman participates in none of the decisions.

Next, I constructed the GOGO variable as a measure of the woman's degree of freedom of mobility. The GOGO variable contains information from three maternal mobility variables

originally recorded by the NFHS-3. The original NFHS-3 variables indicate the places women are usually allowed to go to, meaning: the market, the health facility, and places outside the village or community. And the women demonstrate their degree of freedom of movement outside the home by indicating whether they can go to each of the three places: alone, only with someone else, or not at all.

To create the GOGO variable, I first combined the information from the three original NFHS-3 variables. I aggregated this information by creating a count of the number of places the woman (i) can go and (ii) can go alone. Afterwards, I created the GOGO variable with these designations: (0) the woman can go alone to all the locations, (1) the woman can go alone to only some of the locations or she must be accompanied always, and (2) the woman cannot go to any of the locations. Like the DECISION variable, the GOGO variable assigns the most patriarchal experience the greatest numerical value.

The last empowerment variable I constructed is the COUNTBEAT variable, which measures the woman's attitude towards domestic abuse. Although there are certainly other instances of domestic violence that affect the woman's empowerment, accepted statistics indicate that spousal violence is the most prevalent form of domestic violence that women age 15-49 experience in India. Therefore, I created the COUNTBEAT variable to capture the wife's attitude toward domestic violence instances as perpetrated by the husband**.** The COUNTBEAT variable incorporates information from five original variables that indicate the number of instances that woman believes wife-beating is justified—these instances include: if the wife goes out without telling him, if she neglects the house or children, if she argues with him, if she refuses to have sex with him, if she does not cook the food properly. The woman's response of yes, no, or don't know to any of these instances elucidates the household attitude regarding

gender roles. We expect women who have more egalitarian gender-role attitudes to be less likely to condone spousal abuse, and, therefore, to be more empowered.

Thus, like I had done with the first two indicators, I quantified the responses using an additive index. First, I recoded the responses to give the most patriarchal attitude the greatest numerical value: (0) wife beating is not justified, (1) don't know if wife-beating is justified, and (2) wife beating is justified. For each instance that the woman indicated that she believes domestic violence is justified, meaning, for each instance that an observation is coded as a 2, the value of the additive index increases by 1. For example, if the respondent approves of all five instances of domestic abuse posed by the questionnaire, she would receive a total score of 5. The highest value of 5, therefore, indicates the most patriarchal beliefs toward spousal abuse and the lowest value, at a 0, indicates the most progressive beliefs. The COUNTBEAT variable is, thus, an index of the total number of instances wherein the woman agrees that domestic violence was justifiable.

The last explanatory variable, the mother's highest level of education, was coded as ordinal variables: (0) no education, (1), primary, (2) secondary, and (3) higher. This variable combines the necessary data as is, so I did not see a need to construct a new variable.

(ii) Dependent Variables

As I stated earlier during my discussion of the analysis' anthropometric data, the NFHS-3 sample includes the heights and weights of children <5 years old. The survey's capping of anthropometric measurements at 59 months gives researchers the discretion to limit their sample size accordingly. Unfortunately, this discretion also leads to a lack of consistency in various studies' use of age ranges in their analysis, which hinders the scope of scholarly review. For instance, some studies like to cap measurements of childhood nutrition outcomes at 59 months,

others like to do so at 36 months, and others argue that the cap should be during the end of the second or third year of a child's life (Maluccio *et al.*, 2007; Ruel, 2010; Cunningham *et al.*, 2014). Indeed, both Cunningham and Ruel argue that child nutrition outcomes may be more accurately measured up to 24 or even 36 months, given that children within this age range are more dependent on their mothers, and therefore, are more responsive to changes in the mother's empowerment status. Until recently, many studies use the 59 months' cut-off, however, I believe that future studies should be mindful of growing evidence-based support for a lower age cut-off. Considering this information, our analysis limits the sample size to children from zero to three years of age.

The anthropometric information expresses nutritional status as standard deviation units, or Z-scores, from the median of the reference population[2]. My analysis looked at the Height for Age Z-score (HAZ score) and the Weight for Height Z-score (WHZ score) to determine the prevalence of stunting and wasting, respectively. Children who are stunted or wasted have HAZ and WHZ scores that are less than -2, which means that they are less than two standard deviations below the median. These two indexes of the child's nutritional status are widely-used as measures of malnutrition because they identify long-term growth faltering and acute growth disturbances. In the analysis, the child's nutritional status was coded using dummy variables "1," for stunted and/or wasted, and "0," for healthy.

(iii) Control Variables

To isolate the effect of women's empowerment on child nutrition status, the regression models controlled for Maternal Age at Birth, socioeconomic status as measured by Household

[2] The Z scores represent the number of standard deviations above or below pre-derived growth reference curves obtained from a reference population from the United States National Centre for Health Statistics, as recommended by the WHO (2006).

Wealth Index in quintiles, and the Type of Place of Residence, as classified by urban vs. rural living conditions. The maternal age at birth, an originally continuous variable, was recoded into a categorical variable with the following set of terms: (1) comprises of teenage years, or 12-18, (2) comprises of adolescent to adulthood years 19-34, and (3) comprises of adulthood to middle-age years 35-56. Household wealth index is an ordinal variable with categories that refer to: (1) poorest, (2) poorer, (3) middle, (4) richer, and (5) richest. The type of residence is a binary variable containing classifications of: (1) urban and (2) rural.

(c) Methodology

I began the data analysis with descriptive statistics for all the variables of interest, including the control variables. After I documented the differences in frequency and variance of key attributes of the children, their mothers, and their households, I carried out a brief bivariate analysis of the independent and dependent variables to determine the nature of their relationships. The bivariate analysis consisted of cross-tabs of the dependent variables by the independent variables, with all continuous variables recoded into discrete variables prior to carrying out the analysis. In conjunction with the cross tabs, I ran chi-square tests between all combinations of the explanatory and response variables. The results of the chi-square tests allow us to determine the significance of the relationships, which helps us to establish the first step in demonstrating causality. I also ran a chi-square test of the two dependent variables to determine the strength of their correlation. In the case that a high enough or a significant correlation exists between the two response variables, my model must include the appropriate statistical analysis to account for this association.

Afterwards, I used logistic regression analysis to predict the odds of stunting and wasting relative to the four explanatory variables. This method is most apt as the main method of

multivariate analysis as opposed to OLS regression because the study's stunting and wasting outcomes are measured with dichotomous variables. To determine my modeling strategy, I ran a correlation of the three empowerment indicators with each other as well as examined the means on each of the empowerment variables by education. After I examined the correlation coefficients of the empowerment indicators with each other and the nature of its relationship with maternal education, I carried out the logistic regression analysis for both response variables.

My analysis includes five models for each malnutrition measure. All the models include our three controls—that is, Maternal Age at Birth, SES as measured by Household Wealth Index, and Type of Place of Residence (urban vs. rural). Model 1 includes Attitudes Toward Domestic Violence; Model 2 includes Mobility; Model 3 includes Participation in Household Decision-Making; Model 4 includes Highest Educational Level; and Model 5 includes the three controls and the four empowerment indicators. In summary, there are five models per nutrition marker or ten total for both.

After I ran alternative models with various specifications, I chose to denote all the predictors and controls in my model as categorical variables using the form i.*varname*. This method allows non-linearity in the variables' effects, which gives us a more accurate depiction of the relationships between each of their subcategories and stunting and wasting. We can look at our control Maternal Age at Birth as an example of how its categorization markedly improved our analysis. In our discussion on its theoretical relevance as a control, we learned from prior research that the mother's age at childbirth exhibits a nonlinear association with the child's health outcomes. Thus, if we had treated Maternal Age at Birth as a continuous variable in the analysis, the linear model would've poorly described its U-shaped relationship with our nutritional status markers and hindered us from seeing the true nature of its interactions. The

regression did indeed underestimate the strength of its association and rejected the significance of its effects as a confounder in most of the models when it was initially specified as a continuous variable. As a categorical variable, however, at least one of its subcategories was statistically significant in all ten models, which allows us to draw more precise conclusions about its role in the analysis.

CHAPTER IV: RESULTS

Table 1 shows the descriptive statistics of the variables used in this study, which include key characteristics of children, their mothers, and their households within the sample population.

The data indicate that the stunting and wasting prevalence among children are approximately at 35% and 17%. In our sample, almost 53% of women are either uneducated or have not attained a post-primary education level. And only as much as 8% of women have either began or finished higher education. The maternal age at birth indicates that most of the sample, or at 86%, was within the 19-34 years range when they gave birth, with the mean maternal age falling slightly above 24 years old.

Regarding household decision-making, 33% of women said that they do participate in making decisions regarding their own health care, making major household purchases, making purchases for daily household needs, whether she can visit her family or relatives, and how to parse her husband's earnings—either jointly with her husband or alone. Conversely, 16% indicated that they do not participate in any capacity in household decision-making regarding those five matters. The remaining 52% take part in some but not all of the decisions.

Overall, a little more than 3% of women say that they do not travel alone to any of the three locations asked in the survey, whereas 31% reported that they do travel alone to all three locations. The largest population of women at 66% comprise of those who can either go alone to only one or two of the places, or are accompanied by her husband or someone else to one or two of the places.

Around 48% of women in the sample agreed that a husband justifiably hits or beats his wife in at least one of the following seven listed situations: if she goes out without telling him, if she neglects the house or children, if she argues with him, if she refuses to have sex with him, if

she doesn't cook the food properly—i.e., she burns it. The remaining population of women at 52% did not agree that any of those five reasons rightly warranted physical spousal abuse.

The household wealth quintiles divided the sample into five different economic strata, and separates the household population into brackets according to their relative level of wealth, considering their expenditure and income measures. The data shows that the largest population of homes in the analytical sample fall within the richer and richest subdivisions at 23% and 21%. And, finally, the type of place of residence variable categorizes individual households as located within urban or rural areas according to the size of the applicable area. The NFHS-3 classified rural areas as areas that are countryside, with urban areas making up of a range of city sizes, from small cities to large capital cities with over a million in population. It should be noted that the survey's original sample size of 109,041 households contain relatively even split population of urban and rural residences with approximately 46% and 54% of households in either category. Table 1, however, contains data from our analytical sample size, and indicates that 63% of the families reside in urbanized spaces.

Table 1.
Descriptive Statistics of Key Variables Used

	N	Percent	Std.	Min/Max	Description
Child Attributes					
Age in Months	**23,040**	(mean=18.35)	10.07	0/35	Continuous
Stunting Prevalence	8,086	35.10	0.48	0/1	Binary
Wasting Prevalence	3,970	17.23	0.38	0/1	Binary
Mother's Attributes					
Highest Educational Level	**23,040**	(mean=1.17)	1.04	0/3	Ordinal
No Education	8,902	38.64			
Primary	3,261	14.15			
Secondary	9,016	39.13			
Higher	1,861	8.08			
Maternal Age at Birth in Years	**23,040**	(mean=1.97)	0.92	1/3	Ordinal
12–18	2,199	9.54			
19-34	19,777	85.84			
35-49	1,064	4.62			
Participation in Decision Making	**23,040**	(mean=0.83)	0.68	0/2	Ordinal
Participation in all of five decisions	7,589	32.94			
Participation in at least one of five decisions	11,862	51.48			
Participation in zero of five decisions	3,589	15.58			
Mobility	**23,040**	(mean=0.72)	0.51	0/2	Ordinal
No Mobility	695	3.02			
Low Mobility (alone or with someone else)	15,197	65.96			
High Mobility (always can go alone)	7,148	31.02			
Attitudes Toward Domestic Violence	**23,040**	(mean=0.48)	0.50	0/1	Binary
Never justified for all reasons	11,947	51.85			
Justified for one or more reasons	11,093	48.15			
Household Attributes					
Wealth Index (Quintiles)	**23,040**	(mean=3.12)	1.39	1/5	Ordinal
Poorest	3,981	17.28			
Poorer	4,233	18.37			
Middle	4,750	20.62			
Richer	5,217	22.64			
Richest	4,859	21.09			
Type of Place of Residence	**23,040**	(mean=1.63)	0.48	1/2	Categorical
Urban	8,429	36.58			
Rural	14,611	63.42			

Source: *National Family Health Survey India 2005-06*

Table 2 provides a more detailed look at the statistics of our three indicators of empowerment, broken down into their respective components. With respect to the population sample, we see that married women are most likely to take part in decisions regarding their own healthcare at 62.2% reporting that they do so, and are least likely to do so concerning large household purchases, with only 52.9% saying that they do. We can also see that 67% of women say that they must be accompanied to go to all three locations, reaffirming our earlier estimation that only 33% of women have complete freedom of mobility. Lastly, we learn that women are most likely to justify domestic violence in situations wherein the wife neglects the house or

Table 2.
Women's Empowerment as Measured by Key Indicators

Women's Empowerment Measurements	**Percent**
Percentage respondents who have some say in making decisions (alone, with husband, or other)	
Own healthcare	62.2
Making major household purchases	52.9
Making purchases for daily needs	60.1
Visiting their family or relatives	60.5
Participates in all four decisions	36.7
Percentage respondents who have some degree of mobility (alone, with husband, or others)	
Can go alone to all listed locations	33.0
Can go to listed locations with someone else only	67.0
Percentage of respondents who justified domestic violence	
Wife beating justified if	
She goes out without telling husband	29.0
She neglects the house or children	34.7
She argues with husband	30.3
She refuses to have sex with him	14.1
She doesn't cook properly	20.4

Source: *National Family Health Survey India 2005-06*

children at 34%, and are least likely to do so in situations where the wife refuses to have sex with the husband at 14%.

Tables 3 through 11 depict the cross tabs results of each explanatory variables by both measures of malnutrition. Most of the bivariate relationships are significant with a p-value <0.05, as indicated by the results of the chi-square tests, apart from two cross tabs that failed to reject the test of independence. The cross tabs that aren't statistically significant are (i) wasting by decision-making and (ii) wasting by mobility. Although there are many reasons why these two relationships aren't statistically significant, we will have more of an explanation once we examine the results of the logistic regression models. Moreover, even though most of the crosstabs demonstrate that the relationship between stunting and wasting in relation to the women's empowerment indexes are significant, it is possible that the differences in the levels of empowerment are explained by any of the three controls. I therefore examined the interrelationship between these variables later in the logistic regression before I drew any further conclusions.

Table 3 shows the distribution of stunting prevalence by maternal education. In general, the prevalence of stunting decreases with increased levels of maternal education, with the lowest prevalence of stunting most likely occurring in mothers who have the highest level of education. Table 4 displays similar results with the distribution of wasting prevalence by maternal education, albeit with less striking results than that of Table 3. The prevalence of wasting decreases with increased levels of maternal education, with the lowest prevalence of wasting most likely occurring in mothers who attained higher education. The chi-square tests for both Tables 3 and 4 indicate that differences in levels of education are significant relative to stunting and wasting prevalence.

Tables 5 and 6 shows the distribution of stunting and wasting prevalence by participation in household decision-making. The degree of participation is measured by the number of household decisions the mother is involved in—that is, all five of them, some (1 to 4) of them, or none of them. Table 5's results show a general trend of decreased stunting with greater involvement in household decision-making. Its results are significant according to the chi-square test. The results in Table 6 also indicate that the prevalence of wasting decreases with greater involvement in household decisions, however, this relationship is not statistically significant.

Tables 7 and 8 show the distribution of stunting and wasting by degree of autonomy the mother has in going outside of the home. These two cross tabs depict classifications of mobility like those in Table 1. The woman has high mobility if she's able to travel alone to the market, the health facility, and places outside of her village or community; low mobility if she's usually accompanied to one or two of these locations; or no mobility if she's never allowed to travel by herself to any of the locations. Table 7's results indicate that the lowest prevalence of stunting most likely occurs with the greatest amount of freedom in maternal mobility. These results are significant according to the chi-square test. Table 8 similarly indicates that child wasting less likely occurs when women have the greatest amount of freedom of mobility. However, unlike the relationship between stunting and mobility, wasting by mobility does not show a significant relationship according to the chi-square test results.

Tables 9 and 10 show the distribution of stunting and wasting prevalence by maternal attitudes toward domestic violence. The mother's attitude is depicted by a numerical scale of 0 to 5, with 0 being the most progressive beliefs, and 5 being the most patriarchal. The results indicate that both stunting and wasting least likely occur with mothers who have the most progressive attitudes towards domestic violence. In other words, this trend tells us that the child

more likely experiences stunting and/or wasting with greater approval of spousal abuse. The results for both relationships are significant according to the chi-square test.

Table 11 depicts a crosstab of the two dependent variables, or stunting by wasting. The results indicate that the relationship is not significant, which allows us to analyze one dependent variable at a time in relation to the explanatory variables later in the logistic regression models.

Table 12 gives us a correlation matrix of the three empowerment indicators by each other. The three variables are correlated with each other, albeit the coefficients are all less than 0.90. Although these results do not indicate a high intercorrelation among the predictors, I nevertheless created four separate models wherein I examined the effect of each indicator by itself. Lastly, Table 13 shows the means of the three empowerment indicators by highest maternal education, which gives us a snapshot of the relationships between the four predictors. The results show a general downward trend in the means of the empowerment indicators with increasing educational attainment. As our analysis assigns smaller numerical values to increased maternal empowerment, the results indicate that freedom of mobility outside the home, participation in household decision-making, and disapproval of spousal abuse are all positively associated with more education. The presence of this association affirms my intentions to examine the predictors individually in separate models.

Table 3. Stunting by Maternal Education

Highest Educational Level	Stunted 0	1
No Education	54.44	45.56
Primary	61.91	38.09
Secondary	72.05	27.95
Higher	85.60	14.40
Total	64.90	35.10
(n)	(14,954)	(8,086)

* Chi-square test significant at p <.05

Table 4. Wasting by Maternal Education

Highest Educational Level	Wasted 0	1
No Education	79.40	20.60
Primary	81.11	18.89
Secondary	85.66	14.34
Higher	87.80	12.20
Total	82.77	17.23
(n)	(19,070)	(3,970)

* Chi-square test significant at p <.05

Table 5. Stunting by Decision-Making

Decision-Making Involvement	Stunted 0	1
Participation in All	66.02	33.98
Participation in Some	64.71	35.29
Participation in None	63.19	36.81
Total	64.90	35.10
(n)	(14,954)	(8,086)

* Chi-square test significant at p <.05

Table 6. Wasting by Decision-Making

Decision-Making Involvement	Wasted 0	1
Participation in All	83.13	16.87
Participation in Some	82.72	17.28
Participation in None	82.17	17.83
Total	82.77	17.23
(n)	(19,070)	(3,970)

* Chi-square test **not** significant at p <.05

Table 7. Stunting by Mobility

Degree Of Mobility	Stunted 0	1
High Mobility	68.35	31.65
Low Mobility	63.24	36.76
No Mobility	65.90	34.10
Total	64.90	35.10
(n)	(14,954)	(8,086)

* Chi-square test significant at p <.05

Table 8. Wasting by Mobility

Degree Of Mobility	Wasted 0	1
High Mobility	83.23	16.77
Low Mobility	82.56	17.44
No Mobility	82.59	17.41
Total	82.77	17.23
(n)	(19,070)	(3,970)

* Chi-square test **not** significant at p <.05

Table 9. Stunting by Attitudes Toward Domestic Violence

Domestic Violence Attitude Index	Stunted 0	1
0	66.61	33.39
1	65.17	34.83
2	63.85	36.15
3	62.95	37.05
4	62.14	37.86
5	59.01	40.99
Total	64.90	35.10
(n)	(14,954)	(8,086)

* Chi-square test significant at p <.05

Table 10. Wasting by Attitudes Toward Domestic Violence

Domestic Violence Attitude Index	Wasted 0	1
0	83.03	16.97
1	82.23	17.77
2	82.08	17.92
3	83.88	16.12
4	81.32	18.68
5	82.60	17.40
Total	82.77	17.23
(n)	(19,070)	(3,970)

* Chi-square test significant at p <.05

Table 11. Stunted by Wasted

Stunted	Wasted 0	1
0	82.75	17.25
1	82.80	17.20
Total	82.77	17.23
(n)	(19,070)	(3,970)

* Chi-square test **not** significant at p <.05

Table 12. Correlation of Empowerment Indicators

	GOGO	DECISION	COUNTBEAT
GOGO	1.0000		
DECISION	0.1854	1.0000	
COUNTBEAT	0.0424	0.0444	1.0000

Table 13. Means of Empowerment Indicators by Education

No Education

Variable	N	Mean	Std. Dev.	Min	Max
gogo	8,902	0.78949	0.48682	0	2
decision	8,902	0.89328	0.69023	0	2
countbeat	8,902	1.51842	1.73249	0	5

Primary Education

Variable	N	Mean	Std. Dev.	Min	Max
gogo	3,261	0.76326	0.49610	0	2
decision	3,261	0.85127	0.67444	0	2
countbeat	3,261	1.42012	1.66712	0	5

Secondary Education

Variable	N	Mean	Std. Dev.	Min	Max
gogo	9,016	0.68822	0.51882	0	2
decision	9,016	0.79104	0.66045	0	2
countbeat	9,016	1.15583	1.54317	0	5

Higher Education

Variable	N	Mean	Std. Dev.	Min	Max
gogo	1,861	0.46480	0.52617	0	2
decision	1,861	0.63068	0.61601	0	2
countbeat	1,861	0.49275	1.05115	0	5

Tables 14 and 15 depict the odds ratios from five logistic regression models predicting the odds of stunting and wasting, respectively, relative to the predictors. All analytical models of each nutritional marker control for Maternal Age at Birth, Household Wealth Index, and Type of Place of Residence. These demographic controls remain strongly associated with stunting and wasting, which confirm their roles as confounders in this analysis. Models 1 through 4 examines Attitudes Toward Domestic Violence, Mobility, Participation in Household Decision-Making, and Highest Level of Education as individual predictors, and Model 5 includes all four predictors.

The first model examined the effects of Attitudes Toward Domestic Violence. The results in Table 14 indicate that with controls, the odds of stunting are 1.10 times higher when the Domestic Violence index is 5 than 0. To recall, a higher Attitude Towards Domestic Violence index corresponds to a more patriarchal system of beliefs regarding gender roles. Therefore, the odds of stunting are 1.10 times greater in households where the mother subscribes to the most patriarchal beliefs about domestic violence. This positive association between approval of domestic violence and stunting provides partial evidence in support of Hypothesis 1, which asserts that mothers who justify greater instances of domestic violence are more likely to have children who experience stunting. On the other hand, Model 1 in Table 15 shows us that with controls, the odds of wasting actually *decreases* 0.87 times when the Domestic Violence index is 3 as opposed to 0. This odds ratio says that a moderately patriarchal attitude regarding domestic violence corresponds to lower odds of wasting, which is the antithesis to what we had predicted in Hypothesis 1. The remainder of the Attitudes Toward Domestic Violence subindexes are not statistically significant relative to either outcome variables.

Model 2 displays the effect of Mobility on stunting and wasting. Table 14's results indicate that with controls, the odds of stunting are 1.07 times higher when the mother has Low as opposed to High Mobility. We had classified High Mobility as the ability to travel outside the home alone, whereas Low Mobility means that she is limited, but not entirely, in her freedom of movement. This data provides evidence in support of Hypothesis 2, which had predicted that less mobility corresponds to greater odds of stunting. We did not find further evidence in support of Hypothesis 2 regarding the association between freedom of mobility and wasting, however. Indeed, Model 2 in Table 15 indicates that with controls, Mobility is not statistically significant relative to wasting. We also failed to find support for Hypothesis 3 with our third model. Model 3 examines the effect of Participation in Household Decision-Making on stunting and wasting, and its results are both statistically insignificant.

Our second to last model looked at the variability in the mother's schooling relative to stunting and wasting. As predicted in Hypothesis 4, an increase in Highest Educational Level corresponds to decreased odds of both stunting and wasting. Tables 14 and 15 indicate that a secondary level of education predicts lower odds of stunting and wasting at the 99% confidence level. More specifically, a secondary level of education corresponds to decreases in the odds of stunting by 0.66 times and wasting by 0.83 times in comparison to no education. Apart from a secondary level of education, the other levels of schooling differ in how they relate to stunting and wasting. All subcategories of education are statitiscally significant relative to stunting, but, only Seconday and Higher Levels of education are significant predictors of wasting.

Model 5 tests the associations of all four indicators relative to stunting and wasting. Model 5 in Table 14 shows that with controls and other indicators, Attitudes Toward Domestic Violence and Mobility are no longer significant predictors of stunting. However, Attitudes

Toward Domestic Violence remains a significant predictor of wasting in Model 5, even after controlling for other indicators. Both Models 1 and 5 in Table 15 indicate that there is a negative association between a moderate approval of domestic violence and wasting. These findings underscore the lack of statistical evidence in support of Hypothesis 1, and introduces a relationship with regards to wasting that is rather unanticipated in light of what previous research have found.

Another noteworthy, but unsurprising, outcome of Model 5 has to do with the mother's level of education. This predictor remains statistically significant in prediciting the odds of both stunting and wasting, even after controlling for other indicators. The odds ratios for stunting remained the same as in Model 4, but the odds of wasting with respect to Higher Education changed slightly in Model 5. Initially, Model 4 indicates that the odds of wasting for mothers with higher education decreases 0.81 times in comparison to mothers who have no education. Model 5 says that the odds decreases 0.80 times. The narrowing of the differences in the odds of wasting between the Higher Education and No Education categories shows that one or more of the other indicators may help(s) explain the association between education and wasting. Determining which indicator particularly facilitates this association is outside the scope of this analysis, but makes for an interesting focus of research for future studies.

Table 14.

Effects of Attitudes Toward Domestic Violence, Mobility, Decision-Making, and Maternal Education on Stunting Odds Ratios

	Model 1	Model 2	Model 3	Model 4	Model 5
Attitudes Toward Domestic Violence					
Justified for one reason only	0.96				0.95
Two of five reasons	0.98				0.96
Three of five reasons	1.00				0.98
Four of five reasons	1.00				0.98
Justified for all five reasons	1.10†				1.06
Mobility					
High Mobility					
Low Mobility		1.07*			1.03
No Mobility		0.93			0.88
Participation in Household Decision-Making					
Participation in all five decisions					
Participation in at least one of five decisions			1.04		1.01
Participation in zero of five decisions			1.04		0.97
Mother's Attributes					
Highest Educational Level					
No Education					
Primary				0.81***	0.81***
Secondary				0.66***	0.66***
Higher				0.40***	0.40***
Maternal Age at Birth in Years					
12-18					
19-34	0.77***	0.78***	0.78***	0.78***	0.77***
35-49	0.74***	0.75***	0.75***	0.70***	0.70***
Household Attributes					
Wealth Index (Quintiles)					
Poorest					
Poorer	0.81***	0.81***	0.81***	0.87**	0.87**
Middle	0.59***	0.60***	0.60***	0.69***	0.70***
Richer	0.42***	0.42***	0.42***	0.54***	0.54***
Richest	0.22***	0.22***	0.22***	0.35***	0.35***
Type of Place of Residence					
Urban					
Rural	0.86***	0.86***	0.86***	0.86***	0.86***

† p < 0.1 * p <0.05 ** p <0.01 *** p < 0.001

Source: *National Family Health Survey India 2005-06*

All models control for Maternal Age at Birth, SES as measured by Household Wealth Index, and Type of Place of Residence (urban vs. rural).

Table 15.
Effects of Attitudes Toward Domestic Violence, Mobility, Decision-Making, and Maternal Education on Wasting Odds Ratios

	Model 1	Model 2	Model 3	Model 4	Model 5
Attitudes Toward Domestic Violence					
Justified for one reason only	1.00				1.00
Two of five reasons	1.00				0.99
Three of five reasons	0.86*				0.86*
Four of five reasons	1.02				1.01
Justified for all five reasons	0.91				0.90
Mobility					
High Mobility					
Low Mobility		0.97			0.95
No Mobility		0.96			0.94
Participation in Household Decision-Making					
Participation in all five decisions					
Participation in at least one of five decisions			1.03		1.03
Participation in zero of five decisions			1.05		1.05
Mother's Attributes					
Highest Educational Level					
No Education					
Primary				1.00	1.00
Secondary				0.83***	0.83***
Higher				0.81*	0.80*
Maternal Age at Birth in Years					
12-18					
19-34	1.14*	1.14*	1.15*	1.15*	1.14*
35-49	1.15	1.13	1.15	1.12	1.12
Household Attributes					
Wealth Index (Quintiles)					
Poorest					
Poorer	0.79***	0.79***	0.79***	0.81***	0.81***
Middle	0.63***	0.63***	0.63***	0.66***	0.66***
Richer	0.54***	0.54***	0.54***	0.60***	0.59***
Richest	0.40***	0.40***	0.40***	0.47***	0.46***
Type of Place of Residence					
Urban					
Rural	0.91*	0.90*	0.90*	0.91*	0.91*

† p < 0.1 * p <0.05 ** p <0.01 *** p < 0.001

Source: *National Family Health Survey India 2005-06*
All models control for Maternal Age at Birth, SES as measured by Household Wealth Index, and Type of Place of Residence (urban vs. rural)

(a) Discussion of Results

In summary, the results of this analysis provide a couple of interesting findings. The first, and arguably most striking, finding is that the empowerment indicators have markedly different relationships with stunting and wasting. These results were unexpected because conventional thinking describe these measures as different ways to present what is ultimately the same phenomena of malnutrition. Moreover, existing literature cite common risk factors for both of them, such as poverty and lack of access to neonatal services (Victoria *et al.*, 2011). Thus, this study had predicted that stunting and wasting prevalence would vary similarly in response to women's empowerment— that is, though there might be marginally discernable differences, their overall trends should be alike. The data from the regression analyses, however, provides a fair amount of evidence that says otherwise. The most perplexing example shows that approval of domestic violence corresponds to greater odds for stunting, and yet predicts lower odds for wasting. This discrepancy suggests that although the risk factors for both are similar, the physiological mechanisms through which empowerment affects stunting versus wasting may differ.

The second noteworthy finding is that Attitudes Toward Domestic Violence and Mobility are significant indicators of stunting, but when not controlling for other indicators. Although there may be a variety of plausible explanations for this outcome, I will briefly discuss two. The first is that the regression had overstated the effects of the predictors in Models 1 and 2 as a result of omitted variable bias (OVB henceforth). The omitted variable can be a control or predictor that, if excluded from the regression analysis, leads to overestimates or underestimates of the effects of variables that are included. OVB often occurs when the predictors are correlated with both the outcome variables and with each other, which is the case in this study. As our

models include the same controls throughout, the omitted variable that may have affected the estimates of Models 1 and 2 could very well have been one of the other empowerment indicators. Once the two indicators in question were no longer statistically relevant as part of Model 5, wherein no predictors were omitted, we must consider the possibility that the prior estimates of their effects were biased.

Another theory why controlling for other indicators led to reduced strengths of associations between stunting and Attitudes Toward Domestic Violence and Mobility involves the statistical power of the tests. Unlike Models 5, Models 1 and 2 examined fewer covariates of interest. As a result, our study was well-equipped—or better powered— to detect the effect size in question in these earlier models. When Model 5 tests the relationships of several more covariates, the very same effect size may have had much lower statistical power, making it difficult to once again observe a statistically significant relationship.

The third finding of interest is that of the negative association between approval of dometic violence and wasting. Past findings on the relationship between domestic violence and poor nutrition outcomes in India measure *exposure* or *experience* of physical abuse by a family member as a predictor of malnutrition among women and children (Ackerson and Subramanian, 2008). The results demonstrate a positive association between domestic violence exposure and wasting among children, even after adjusting for many socioeconomic and demographic differences. Although this earlier study differs from ours in its measure of domestic violence as *experiences* instead of as attitudes, its findings nevertheless imply that the presence of domestic violence correlates with worse nutritional outcomes. Moreover, as far as I know, there aren't any other studies that suggest a moderate level of approval of domestic violence corresponds to decreased odds of wasting.

Despite its peculiarity, there may be a way to explain this association. I had mentioned in my literature review that past studies primarily use the woman's actual experience of gender-based violence as a predictor of child nutritional status. Studies of this nature tend not to use attitude because (i) experience of physical violence is a better measure of the woman's empowerment and (ii) its effects directly impact the mother's physical health, which better predicts the child's health consequences. These points certainly have merit. For instance, a woman who justifies certain instances of wife-beating only demonstrates that she adheres to some of the more patriarchal ideals of her society. The degree to which she condones spousal abuse is not indicative of her daily experiences as a wife in the household. Indeed, her attitude reveals little about whether or not she actually experiences domestic violence, or is exposed to any of its harmful effects, which hinders our ability to determine the nature of her or her child's health. This idea is especially pertinent in studies that examine the child's more immediate health consequences, like wasting. As a measure of acute nutrient inadequacy, wasting is best explained by instances of domestic abuse if the acts were perpertrated within the year of the anthropometric measurements (Ackerson and Subramanian, 2008). Otherwise, researchers have difficulty finding a sensible and significant link.

Considering this information, it's understandable why this odd relationship between attitudes and wasting occurred. Firstly, the woman's attitudes toward domestic violence is an inadequate measure of the degree of her empowerment. Secondly, even if her attitude was somehow indicative of the power dynamics in the household, its ability to act as an important predictor of the child's wasting depends heavily on the timing of the anthropometric measurements. If the analysis had used a more appropriate measure of exposure to partner

violence as well as controlled for the time intervals between acts of domestic violence and the recording of anthropometric measurements, the results might have been more favorable.

The last important finding is that the mother's level of education is a significant indicator of stunting and wasting, even when controlling for other indicators. As with the majority of our outcomes, though, there is a discrepancy in how variability in education affects stunting versus wasting. Whereas any increase in the mother's schooling corresponds to decreased odds of stunting, the odds of wasting only show a significant decrease when the mother reaches a secondary or higher level of education. Nevertheless, these results provide further evidence in support of long-accepted findings that the mother's education has a significant impact on the child's nutritional status.

As with any study, there exists some limitations that may make this study's results problematic. The first issue is the use of cross-sectional data. Although the NFHS-3 provides a large sample size for analysis, its data only provides a small snapshot of the nature of power dynamics in households across modern-day India. An analysis that aims to adequately capture the effects of gender inequality, such as that of the systemic disempowerment of women, needs longitudinal data. It is difficult to make assumptions regarding the effect that the empowerment of women could have on child nutritional status over time without long-term data. Similar studies use datasets from prior rounds of NFHS to capture the demographic trends that longitudinal data would provide, but the issue of inconsistent parameters for the child's anthropometric measurements and surveying methods make reconciling the information from multiple datasets challenging. However, it has been done.

Other potential issues arise from various shortcomings in the conceptual framework and statistical analysis. The use of appropriate statistical measures confers greater internal validity to

the experiment, and allows us to interpret the results with greater confidence of accuracy. The first limitation is that the models only included three demographic controls. Prior research shows that many more factors can act as confounders in the relationship between women's empowerment and child nutritional outcomes. As I had mentioned in my discussion on controls in the literature review, future research should more carefully examine the extent to which these potential confounders can change the results of our analysis. Another important limitation lies in my not correcting for the slight correlation between all the explanatory variables. Although the correlations of the predictors were small, their effect might have been hard to detect due to this multicollinearity. Thus, the relationships between our predictors and outcome variables might have been more accurate had I included the interaction effects of the predictors in the analysis and the models. I also did not follow the recommended method of handling missing cases in studies of this nature, which is to perform multiple imputations of missing values on the explanatory variables using the –mi- command suite in STATA. Moreover, the large amount of missing cases makes it difficult for the analysis to have maintained a nationally representative sample size. The analysis still had a large sample size, however, the results may not be as generalizable.

CHAPTER V: CONCLUSIONS

This study reveals that women's empowerment is an incredibly complex issue, which can confer wide-ranging effects on the child's health. The literature review initially established that there needs to be greater efforts among researchers and public health officials to define and operationalize women's empowerment. The lack of consistent methodology to measure empowerment make comparing and building on past research challenging. Moreover, the results of this analysis showed the importance of accounting for the woman's opportunity structure, or the demographic variations that make up her community, in examining her degree of empowerment. Future research needs to take great care in conceptualizing women's empowerment as a function of the woman's unique interactions with her community, regardless of whether the focus is on household rather than community dynamics.

The results of this analysis show that measuring women's empowerment is extremely difficult. More specifically, a more in-depth look at the effectiveness of direct vs. indirect indicators in measuring empowerment is needed. Even though direct indicators are universally known as more accurate measures of empowerment, none of the direct indicators used in this study demonstrated any significant effects on the child's nutritional status. The negative association between approval of domestic violence and wasting is a strange exception, though. Although I did offer a plausible explanation for the errors that could have led to this result, I did not consider the possibility that this relationship could indeed be truly representative of an interaction that's occurring in India. A potential way to sparse out the accuracy of this association would be to aggregate indexes of more scenarios wherein the mother reveals her attitudes about gender roles, and not just regarding domestic violence. This method would

provide a more accurate depiction of how strictly she adheres to patriarchal norms, which may be a better measure of her level of empowerment in the household.

The one indirect indicator of empowerment used, however, did show consistently strong associations to stunting and wasting. This indicator was the mother's level of education, and its role as a significant predictor of nutritional status affirms the importance of ensuring that all girls have proper access to education. However, the fact that increased education at all levels leads to decreased odds of stunting, but only secondary or higher levels do so for wasting makes for an interesting topic of further analysis. This discrepancy in the effect that empowerment has on stunting and wasting could be explained by examining the pathways that lead to either nutritional outcomes. Greater research on the differences in risk factors and physiological mechanisms that lead to wasting and stunting could impact how future interventions and policy strategy address the issue of malnutrition.

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BIOGRAPHY

Tammy Spear was born in Ho Chi Minh City, Vietnam in 1994 to two eccentric and too-cool individuals who taught her the importance of a lot of learning and a little of humor. She enrolled at the University of Texas in Fall 2012 as a Plan II Honors, Hindi, and pre-med student, and graduated with too many majors in Spring 2017. After graduation, she plans to attend medical school to fulfill her unrequited dream of picking just one major.